REQUEST FOR PROCUREMENT SERVICES

(1) DOCUMENT NUMBER

STAT

OFFICE/DIV/BR	PROJECT OR CONTRACT OFFICER & EXTENSION	DATE OF REQUEST
FBIS/OPS/ED	[redacted]	6/26/85

		(4) EXPEND.	(5) PROPAGATION FACTOR	(6) PROJECT NUMBER	(7) PROJECT TITLE	(8) AMOUNT
	3540	B	M-	44-0311	INTERNET	$127,062.00

STAT [redacted]

	(10) PRIME ORN	(11) REQUEST NUMBER	OF BUDGET OFFICER/EXT/DATE
44900531107154		4404-85-0021	[redacted] 6/26/85

STAT

(12) CONTRACTOR (if known)	PROPOSAL NO. & DATE	CONTRACT & TASK ORDER NO. (if known)
COMSAT International Comm.	ltr. dtd 25 June 1985	

(13) TYPE OF SERVICE REQUIRED

	1	RESEARCH/DEV
	2	RENTAL
	3	REPAIR
	4	MAINTENANCE
	5	MODIFICATION
X		OTHER (specify) system engineering

TRANSFER OF FUNDS TO OTHER GOVT. AGENCY (specify if applicable)

APPLICABLE ONLY TO REPAIRS AND MODIFICATIONS

TECHNICAL INSPECTION IS REQUIRED BY

☐ RECEIVING DEPOT T & I ☐ TECHNICAL MONITOR

☐ ITEMS TO BE PICKED UP OR ☐ SERVICES PERFORMED AT:

ITEMS TO BE REDELIVERED TO:

monthly and final report

CLASSIFICATION AND STERILITY OF THE PROCUREMENT

	STERILITY		ASSOCIATION CLASS.		WORK CLASSIFICATION		HARDWARE CLASSIFICATION		REPORTS CLASSIFICATION
X	SC 0	X	UNCLASSIFIED	X	UNCLASSIFIED	X	UNCLASSIFIED	X	UNCLASSIFIED
	SC 1		CONFIDENTIAL		CONFIDENTIAL		CONFIDENTIAL		CONFIDENTIAL
	SC 2		SECRET		SECRET		SECRET		SECRET
	OTHER		TOP SECRET		TOP SECRET		TOP SECRET		TOP SECRET

AUTHORITY AND DURATION (see HHB 70-2)

System Engineering Analysis

(See reverse for specific information required on requests.)

APPROVAL

DESIGNATION		DATE
C/ED/FBIS	[redacted]	6/26/85

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PROCUREMENT USE

DATE RECEIVED	RECORDED BY	ASSIGNED TO	NEGOTIATOR

FORM 3-79 2420 USE PREVIOUS EDITIONS

(5-12-38)

1. SUGGESTED SOURCES *(Any sole source recommendation must include a substantive technical justification)*

2. DELIVERABLE ITEMS

REPORTS REQUIRED 5 NO. OF COPIES [x] MONTHLY [ ] INTERIM [ ] QUARTERLY [x] FINAL

HARDWARE *(state type and number)*

OTHER REPORTS

[redacted]s at the conclusion of each specified task.

3. GFP REQUIRED

4. SPECIAL INSTRUCTIONS

COMSAT

INTERNATIONAL
COMMUNICATIONS, INC.

David E. Gourley
Vice President
Marketing & Sales

June 25, 1985

CONFIDENTIAL TO FBIS

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Attached is a proposal to perform the engineering services design, including systems analysis, earth station technical specifications, and a detailed transmission plan and Project Management for the INTERNET System.

The scope, objectives and analytical tasks will be complete by September 30, 1985 for use by FBIS in executing contracts for earth station hardware and terrestrial interconnections in Washington, D.C., Panama and the United Kingdom.

Our rate for this service is on a cost, plus fixed fee basis. The effort amounts to 7.5 man-months at $14,500 per man-month, plus a fee of 15 percent. The total rate is $125,062.

The critical elements, which must begin immediately, are contained in items 1A, B and C of the Engineering Tasks Estimate. The total effort for completing this task is 4.5 man-months at a rate of $14,500 per man-month, plus a fixed fee of 15 percent. The total rate for this service is $75,037.

The implementation of this engineering service is contingent upon COMSAT International receiving the award of the U.S. CONUS earth station, including related O&M for the seven year lease.

COMSAT International looks forward to providing this systems engineering analysis to FBIS and views this effort as a major step to implementing the INTERNET network.

Sincerely,

David E. Gourley

Attachment

950 L'Enfant Plaza, SW
Washington, DC 20024

PROPOSAL
FOR
FOREIGN BROADCAST INFORMATION SERVICE SYSTEM ENGINEERING

1. Scope

This document describes system engineering activities to be performed by the Contractor for the Foreign Broadcast Information Service, U.S. Government. The principal objectives are defined, key system engineering areas are identified, and major tasks are specified. The scope of the work effort is defined to provide adequate technical basis for the INTERNET communications network design and implementation.

2. Introduction

The Foreign Broadcast Information Service, an agency of the U.S. Government, wishes to establish a dedicated communications network linking its Washington, D.C. headquarters with various facilities abroad. Initially, the network is required to provide connectivity between Washington, D.C. and FBIS sites in Panama and the United Kingdom. Additional earth stations are expected to be added to the network later.

The communications network is required to provide the following services:

1. Full motion analogue TV with associated audio. Video signal to noise ratio to be in the 48-49 dB range.

2. Six full duplex 15 KHz voice, single channel per carrier (SCPC) FM circuits. Signal to noise ratio to be 50 dB.

3. One wideband (60 KHz baseband) high speed analogue FM/SCPC channel for facsimile.

4. One voice order wire channel which could be FM/SCPC.

It is anticipated that these requirements might be expanded to twenty 15 KHz channels, two wideband facsimile channels and two TV channels, all to be served in one transponder. The system initially established should accommodate this expansion without disruption of service.

In order to ensure expeditious implementation of an optimal communications network in a cost-effective manner FBIS seeks a careful and thorough engineering and system analysis.

3. Objectives

The major objectives of this objectives are:

1. Development of an appropriate communication system configuration.

2. Provision of detailed technical description of all system segments including terrestrial links, earth terminals and space segments.

3. Provision of a detailed transmission plan for the network.

4. Provision of performance criteria, performance specifications, and interface specifications.

5. Description of alternative network solutions and system configurations if required.

6. Trade off analyses based on appropriate technical, operational, and cost considerations.

7. Development of program management plans, covering all phases from procurement through implementation and verification.

4. Key Areas of Analyses

The following are the key areas that should be addressed:

1. Service Requirements - Present and Projected
2. Traffic Loading
3. Frequency Plans
4. Satellite Link Analysis
5. System Design and Optimization
6. Earth Station Performance
7. Terrestrial Links
8. Reliability and Availability
9. Implementation
10. Verification Tests
11. Earth Station Operation
12. Network Operation
13. Cost Analysis

5. Analytical Tasks

Major analytical tasks are specified in this section. These are intended to provide a guideline for the system design. The Contractor shall perform additional tasks as needed to fulfill the study requirements specified in Section 3.

5.1 Satellite System Analysis

An end-to-end system analysis shall be performed to develop a complete transmission system that fully addresses both the

immediate and anticipated requirements of FBIS. The end product of this analysis will be the recommended space and earth segment parameters and specifications given the maximum space segment capacity of one 36 MHz global transponder.

The analysis will entail the following tasks:

1. Setting of the FM parameters of the analogue voice channels--deviation, pre and de emphasis and IF bandwidths. This task will include a trade off between modulation index (or peak deviation) and carrier to noise density ratio with baseband signal to noise as parameter.

2. Determination of link parameters for the video service, (such as the required link carrier to noise ratio for desired video signal to noise).

3. Link budget analysis. Generate alternative link budgets for the TV, audio and facsimile services based on alternate earth station configurations. The aim shall be to determine an optimum, i.e., balanced, cost effective, technically feasible links forming the network. The output of this task shall be the recommended earth station sensitivity figure of merit--gain to noise temperature ratio--and uplink and downlink EIRPs.

4. Space resource allocation and traffic loading. The distribution of the aggregate bandwidth required for FBIS services shall be determined. Transponder non-linearities may preclude placing all of the initial group of services simultaneously in a common transponder. Appropriate intermodulation analysis shall be performed.

5. Earth station performance analysis. This shall determine the required major earth station performance parameters, such as antenna transmit and receive gain, low noise amplifier (LNA) gain and temperature needed to satisfy the required gain-to-noise temperature ratio, high power amplifier (HPA) output power, etc. Trade-offs such as those between antenna receive gain and LNA noise temperature, and between transmit gain and HPA output power, shall be performed. Technical performance and costs (capital and operational) shall be among the considerations. Earth station performance requirements, for both present and projected traffic plans, shall be specified.

6. A detailed transmission plan for the network shall be developed.

7. Availability and Reliability Analysis. A detailed system availability and reliability analysis shall be performed. This analysis shall include operatonal considerations and shall also indicate enhanced availability and reliability obtainable, on an incremental basis, with additional costs.

Computer-aided analysis, such as use of the carrier Intermodulation Analysis Program shall be used where appropriate.

5.2 Earth Station Site Selection

The goal of this task is to perform a trade off analysis for alternate system configurations taking into account alternative earth terminal locations. Considerations shall include the required wideband links to the FBIS terminals, RFI environment, topography and soil characteristics, excavation costs, need for extensive earth works and barrier construction. Visibility to the geostationary arc, and assurance that the arc remains visible are crucial. Solutions to problems affecting otherwise generally acceptable site, shall be developed as part of this task (for example, the feasibility of shielding where there is an RFI problem). Technical, economical and operational considerations shall be explicitly addressed.

5.3 Terrestrial Link Specifications

The communication services specified by FBIS are characterized by wideband signals which must be transported between the FBIS terminals and the earth stations. Coaxial cable, optical fiber, point-to-point microwave radio relay are the media to be considered. The goal of this task is to determine the most appropriate means for carrying traffic between FBIS terminals and the earth stations. Technical considerations are paramount, but relative costs of different means must be considered. This task must be performed in conjunction with the site selection task as the availability of terrestrial facilities will influence the latter. The analysis must also consider the signal processing associated with each link and the relative cost of leasing wideband circuits vs. the cost of installing dedicated facilities. The solutions may vary in different countries.

5.4 Interface Specification

Two major interfaces are associated with each FBIS terminal, that between the earth station and the communication tail and that between the FBIS terminal and the tail. These interfaces shall be fully defined, including impedances, power levels and

signal levels, the latter referred to a reference test level point (TLP). Where possible, standard interfaces or interface specifications realizable with standard equipments and components shall be designated. Interface specifications shall be provided for all sites.

5.5 Panama Terminal

A complete Statement of Work shall be provided for the terminal in Panama. This shall include earth station technical specifications, procurement specifications, implementation plan and schedule.

5.6 Verification Test Program

A verification test program shall be submitted. This shall describe a test plan in all its aspects deemed necessary to verify that all system performance specifications are met. The test program shall encompass in-plant and on-site tests of components, equipments and sub-systems; tests on earth station parameters including G/T, gain and gain stability, antenna transmit and receive patterns, interface characteristics, and terminal-to-terminal tests. INTELSAT Satellite Systems Operations Guide (SSOG) test procedures may be specified where applicable and appropriate.

The goal of this task is the development of a test programadequate to verify fulfillment of performance specifications, but not needlessly excessive.

5.9 Operation and Maintenance

Operation and Maintenance (O&M) aspects shall be analyzed and described. Detailed O&M cost analysis shall be provided. Both domestic and foreign terminals shall be included in the O&M analysis. O&M procedures shall be optimized for system availability, operational flexibility, service expandability, and cost.

6.0 Project Management

The overall responsibility for the FBIS INTERNET system engineering work defined above will be vested in COMSAT International Communications, Inc.

COMSAT has been providing worldwide satellite services for nearly 20 years and has engineered and managed a large number of international and domestic satellite communications programs. The engineering and program management skill at COMSAT International is concentrated in the Engineering Division, headed by Mr. J. E. Kolsrud, Vice President. The organization chart of the Engineering Division is given in Attachment 1.

6.1 Schedule and Manpower Estimate

The schedule and manpower estimates to perform the work on the tasks as described in the previous sections is given in Attachment 2.

6.2 Technical and Financial Management

The technical and financial management of the INTERNET system engineering project will be provided by the Capital Programs Department, Engineering Division, under the direction of Mr. Helmo Raag who will personally be the project manager. The Capital Programs Department evaluates the technical and operational needs, takes appropriate action and assembles the required resources for the successful implementation of the project. Principal engineering support will be provided by the Network Engineering and Facilities Engineering Departments, headed by Messers Thomas Chow, Director, and Thomas M. Stuart, Manager, respectively.

Through its extensive associations over the years with many U.S. government agencies and domestic and international telecommunications authorities, COMSAT has an in depth background for the planning, implementation and management of satellite communications programs. The Project Manager and the Capital Programs Department will draw on this experience and background. The importance of continuous and efficient communications between the Project Manager and FBIS is recognized. The Project Manager will establish close working relations with the designated FBIS personnel.

6.3 Management Reports

COMSAT International will prepare and submit to FBIS five copies of reports and specifictions as called for in the Statement of Work as well as a summary project status report on a monthly basis commencing 30 days after effective date of contract award.

ATTACHMENT 1